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A NEW SPECIES OF *METAPHYCUS* (HYMENOPTERA: ENCYRTIDAE) PARASITIC ON *SAISSETIA OLEAE* (OLIVIER) (HOMOPTERA: COCCIDAE)

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Abstract.—A new encyrtid species of the *zebratus*-group of *Metaphycus* is described: *Metaphycus hageni* NEW SPECIES. This parasitoid was reared from black scale, *Saissetia oleae* (Olivier), collected on olives near Almuñécar, Spain. This species is similar to *M. lounsburyi* (Howard)[1], but can be distinguished by the relative length of the ovipositor, the shape of the male genitalia, and the shape of the antennal club in both females and males. Characters that differentiate *M. hageni* from closely related species are given.

Key Words.—Insecta, Hymenoptera, Encyrtidae, *Metaphycus, Saissetia oleae.*

Saissetia oleae (Olivier) were collected on olives, *Olea europaea* L., near Almuñécar in southern Spain, in 1985, and shipped to the quarantine facility at the (former) Division of Biological Control, University of California, Berkeley. Numerous specimens of an encyrtid, identified by K. S. Hagen as *Metaphycus* sp. nr. *lounsburyi* (Howard), using the Annecke & Mynhardt (1971) key to the *zebratus*-group of *Metaphycus* species, emerged from the scales. We consider this an unnamed and undescribed species, which we name and describe here. Our description is based on specimens reared from *S. oleae* collected in Almuñécar, individuals from their progeny reared in the insectary using *S. oleae* on oleander (*Nerium oleander* L.), and specimens recovered from various sites in California where the parasitoid was released in olive orchards infested with *S. oleae* (Daane et al. 1991).

METHODS AND MATERIALS

Described specimens were preserved by different methods. Some specimens were mounted dry, without previous treatment, on paper cards or points using book-binders' glue (Yes®) as adhesive. Others were mounted on glass slides, some whole, some dissected as needed. Some specimens were cleared in chloral-phenol (10 g phenol crystals, 10 g chloral hydrate, 3 ml distilled water) and mounted in Faure's medium (60 g lump gum arabic, 100 g chloral hydrate, 25 ml 50% glucose, 25 ml glacial acetic acid, 120 ml distilled water). Measurements of various structures were taken from slide-mounted specimens. The holotype is card mounted, paratypes are both card mounted and slide mounted in Canada balsam following Noyes (1982). Specimens are deposited in the Essig Museum (UCB), University of California, Berkeley; United States National Museum (USNM), Washington D.C.; and the National History Museum (BMNH), London.

[1] According to E. Guerrieri and J. S. Noyes (personal communication) the name *M. lounsburyi* (sensu Compere [1940] and Annecke & Mynhardt [1971]) is based on a misidentification of the type material (Howard 1898), which is redescribed in their manuscript (in preparation) that deals with the European species of *Metaphycus*.

METAPHYCUS HAGENI Daane and Caltagirone, NEW SPECIES

Types.—Holotype: female; data: SPAIN, ANDALUCIA: ≈5 km west of Almuñécar near "La Punta de la Mona" tunnel, 6 Jun 1985, L. E. Caltagirone, reared from *Saissetia oleae* (Olivier) collected on olive (*Olea europaea* L.), deposited: UCB. Paratypes: same data as holotype, 6 females, 4 males, deposited: UCB. Albany, CALIFORNIA, ALAMEDA Co.: Insectary colony, University of California, 11 Jan 1986, K. M. Daane, reared from *S. oleae* on oleander (*Nerium oleander*), 6 females, 4 males, deposited: USNM; 6 females, 4 males, deposited: BMNH.

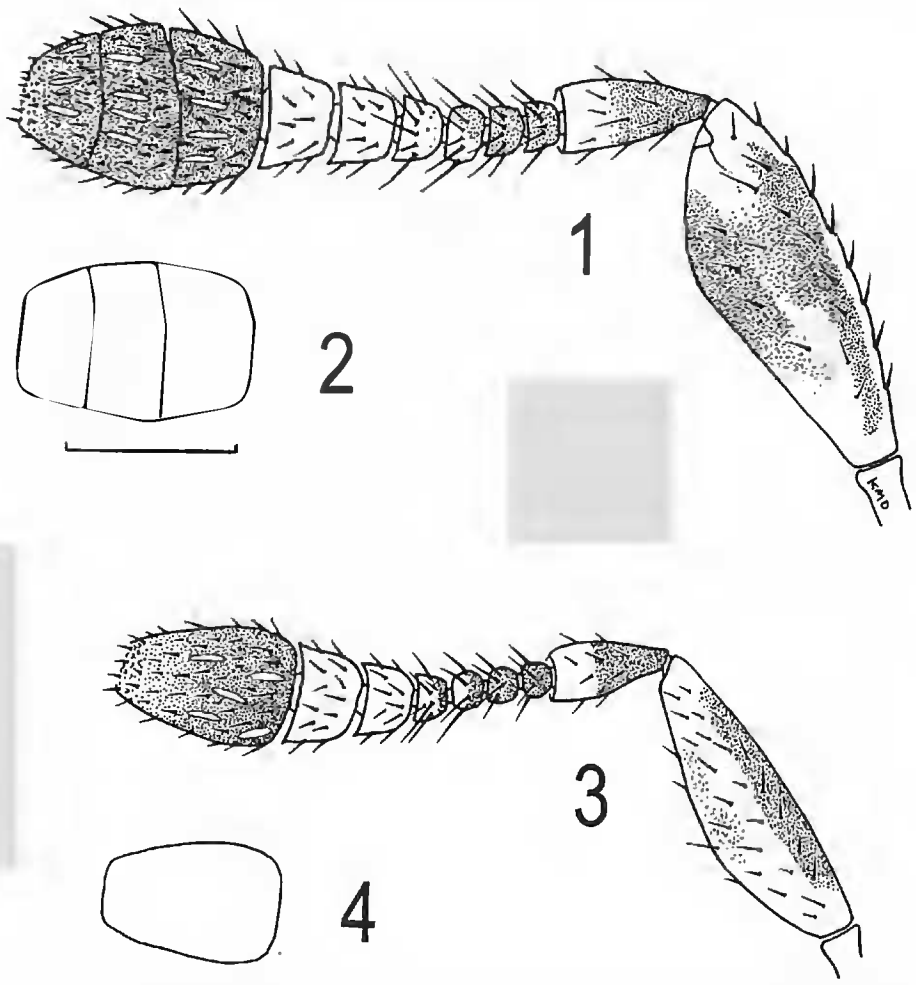
Female.—Length of air-dried specimens 1.3 mm (from frons to tip of ovipositor sheath, range 1.025–1.5, $n = 11$). Color variable: white to pale yellow to golden brown. Frons, upper half of scrobes, mesoscutum, axillae, and scutellum orange yellow, sometimes with a brownish hue; spot on middle of scape extending longitudinally ventrally and dorsally, basal half of pedicel, basal 2 or 3 funicular segments, club, occiput except ridges, a spot on each side and middle of pronotum, anterior of mesoscutum (seen in dissected, slide-mounted specimens), metanotum, propodeum, metasoma dorsally (except for a narrow outer margin) dark brown. Tibiae basally, two oblique rings medially and apically brown, sometimes with faded sections. Mandibles reddish brown fading to pale yellow at base. Ocelli reddish brown. Eyes gray with greenish hue. Wings hyaline. Ocelli forming an acute triangle (≈45°), lateral ocelli about one-half their longest diameter from eye margin, distance from each other about their longest diameter; middle ocellus separate from lateral ocelli by a distance about twice its longest diameter. Scape width 0.36× length (range 0.32–0.40, $n = 32$); pedicel width 0.53× length (range 0.50–0.57, $n = 20$); pedicel 1.08× length of basal 3 funicular segments combined (range 1.05–1.27, $n = 13$); basal 3 funicular segments subequal in width, the apical 3 gradually widening so that the apical segment width 1.94× basal segment width (range 1.69–2.12, $n = 14$); club 3-segmented, ovate, its width 0.66× its length (range 0.55–0.74, $n = 31$), its length 0.81× length of funicle (range 0.69–0.93, $n = 31$) (Fig. 1). Fore wing width 0.44× its length (range 0.41–0.46, $n = 30$); length of stigmal vein 0.22× length of submarginal vein (range 0.17–0.29, $n = 32$). Length of middle tibia 0.98× length of middle femur (range 0.94–1.04, $n = 18$); length of middle tibial spur 0.81× length of middle basitarsus (range 0.71–0.85, $n = 30$). Length of hind tibia 1.08× length of hind femur (range 1.08–1.22, $n = 17$); length of hind tibial spur 0.45× length of hind basitarsus (range 0.41–0.50, $n = 18$). Length of ovipositor (measured as length of 2nd valvulae) 0.80× length of metasoma (range 0.71–0.85, $n = 13$), and 1.06× length of hind tibia (range 1.0–1.15, $n = 14$); length of ovipositor sheaths (3rd valvulae) 0.19× length of 2nd valvulae (range 0.17–0.21, $n = 14$) (Fig. 5).

Male.—Similar to female. Club entire, its length 0.74× (range 0.66–0.78, $n = 12$) length of funicle (Fig. 3). Genitalia long-elliptical (Fig. 6).

Diagnosis.—Females of *M. hageni* can be separated from those of *M. lounsburyi* (Howard) and *Metaphycus bartletti* Annecke & Mynhardt, the two morphologically similar species found in California, by the following characters. *M. hageni* ovipositor is as long or slightly longer than hind tibia, *M. lounsburyi* and *M. bartletti* ovipositors are shorter than respective hind tibia. The antennal club of *M. hageni* (Fig. 1) and *M. bartletti* is ovate, the apex gradually narrowing, the antennal club of *M. lounsburyi* is truncate (barrel-shaped) (Fig. 2). Torular sensillae present in *M. hageni,* absent in *M. lounsburyi* and *M. bartletti.* The genitalia of male *M. hageni* is long-elliptical (Fig. 6), the antennal club rounded at apex; the genitalia of *M. lounsburyi* is wedge-shape (Fig. 8), the antennal club truncate at apex (Fig. 4).

DISCUSSION

Species of *Metaphycus* Mercet are important natural enemies of soft scale (Homoptera: Coccidae). *Metaphycus* species in the *zebratus*-group are parasitic on lecaniine scale (Annecke & Mynhardt 1971). The most commonly known of these

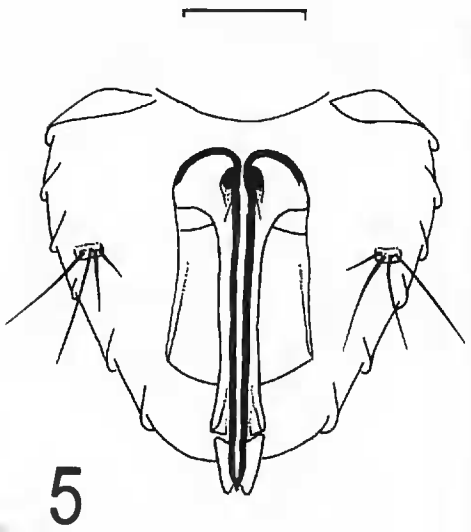


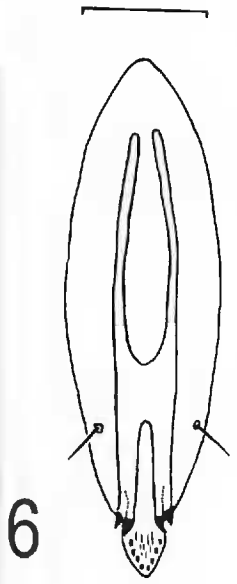
Figures 1–4. Figure 1. *Metaphycus hageni* NEW SPECIES, female antenna. Figure 2. *Metaphycus lounsburyi* (Howard), female antennal club in outline. Figure 3. *Metaphycus hageni* NEW SPECIES, male antennae. Figure 4. *Metaphycus lounsburyi* (Howard), male antennal club in outline. Scale = 0.1 mm.

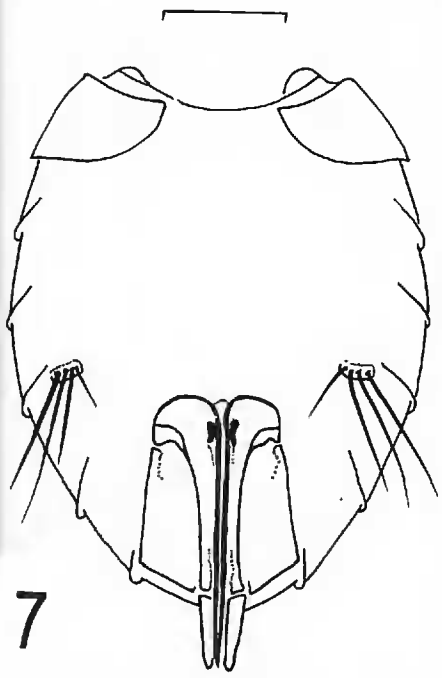
is *M. lounsburyi,* a parasitoid of black scale, *S. oleae. Metaphycus lounsburyi* has a wide geographic distribution, a result of South African material being imported to many areas for improved control of *S. oleae* (Bartlett 1978). During initial taxonomic and behavioral studies with the material imported from Spain, one of us (LEC) and K. S. Hagen noted inconsistencies between specimens of *M. lounsburyi* from California and the imported *Metaphycus* specimens. These observations led to taxonomic, cross-mating, and behavioral studies to determine if imported material was a biotype of *M. lounsburyi,* as has been reported to occur by Panis & Marro (1978), or a different species. Females were never produced in cross-mating experiments (Barzman et al. in press). Observations of oviposition behavior and host-feeding revealed *M. lounsburyi* females deposit eggs through the ventral side of the scale and were not observed host-feeding. *Metaphycus hageni* females deposit eggs through the dorsum of the scale and frequently feed on host body fluids exuding from a puncture through which an egg is never deposited. The collective evidence indicates that *M. lounsburyi* and *M. hageni* are separate species.

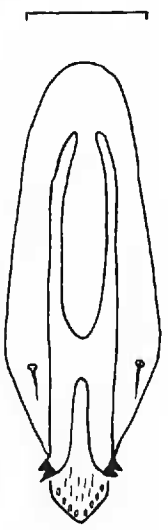
Etymology.—This species is named in honor of our esteemed colleague, the late Kenneth S. Hagen, who was an invaluable adviser during the early stages of our research with this parasitoid and a friend throughout our careers.

Material Examined.—See types. CALIFORNIA, *ALAMEDA* Co.: Insectary of the (former) Division of Biological Control, University of California, Albany, California, 11 Jan 1986, K. M. Daane, reared from *S. oleae* on oleander (*N. oleander*), 20 females, 9 males; slide mounted in Faure's; deposited:









Figures 5–8. Figure 5. *Metaphycus hageni* NEW SPECIES, female ovipositor, ventral view, showing position on metasoma. Scale = 0.1 mm. Figure 6. *Metaphycus hageni* NEW SPECIES, male genitalia, ventral view. Scale = 0.05 mm. Figure 7. *Metaphycus lounsburyi* (Howard), female ovipositor, ventral view, showing position on metasoma. Scale = 0.1 mm. Figure 8. *Metaphycus lounsburyi* (Howard), male genitalia, ventral view. Scale = 0.05 mm.

Kearney Agricultural Center (KAC), University of California, Parlier. CALIFORNIA, *TEHAMA* Co.: 1 km east of Corning, 200 m, 13 Nov 1985, K. M. Daane, reared from *S. oleae* on olive (*O. europaea*), 3 females; slide mounted in Faure's; deposited: KAC.

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